

STATE OF HAWAII

TITLE 12 DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

SUBTITLE 8 DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

CHAPTER 222

POWER BOILERS

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**Historical Note:** Chapter 222 of title 12 is based on chapter 377 of the Hawaii Occupational Safety and Health Standards, Rules and Regulations. [Eff. 7/11/74; am 12/30/76; am 8/22/77; am 8/1/78; R 12/6/82]

**§12-222-1 Age limit of existing power boilers.** The age limit of any boiler having lap-riveted longitudinal joints and operating at a pressure in excess of 50 psig shall be 20 years. This type of boiler, when removed from an existing setting, shall not be reinstalled for a pressure in excess of 15 psig. A reasonable time for replacement, not to exceed one year, may be given at the discretion of the department. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-2 Maximum allowable working pressure for standard boilers.** The maximum allowable working pressure for standard boilers shall be determined in accordance with the applicable provisions of the edition of the ASME code under which they were constructed and stamped. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-3 Safety valves.** (a) The use of weighted-lever safety valves or safety valves having either the seat or disk of cast iron is prohibited; valves of this type of construction shall be replaced by direct, spring-loaded, pop-type valves that conform to the requirements of the ASME Code Section I and are stamped in accordance with section 12-221-6. These requirements are briefly summarized below.

- (1) Each boiler shall have at least one ASME and National Board certified safety valve. If it has more than 500 square feet of water-heating surface, or an electric power input of more than 1100 kw, it shall have two or more safety valves of the same type.
- (2) The valve or valves shall be connected to the boiler, independent of any other steam connection, and attached as close as possible to the boiler, without unnecessary intervening pipe or fittings. Where alteration is required to conform to this requirement, owners or users shall be allowed reasonable time in which to complete the work as permitted by the department.
- (3) No valves of any description shall be placed between the safety valve and the boiler nor on the discharge pipe, if used, between the safety valve and the atmosphere. When a discharge pipe is used, it shall be at least full size of the safety-valve discharge and fitted with an open drain to prevent water lodging in the upper part of the safety valve or in the discharge pipe. Sectional areas of a discharge pipe shall not be less than the full area of the valve outlets discharging therein and the discharge pipe shall be as short and straight as possible and so arranged as to avoid undue stresses on the valve or valves. When an elbow is placed on a safety-valve discharge pipe, it shall be located close to the safety-valve outlet or the discharge pipe shall be anchored and supported securely. When the umbrella or drip pan type of connection is used, the discharge piping shall be so designed as to prevent binding due to expansion. All safety-valve discharges shall be so located or piped as to be carried clear from walkways or platforms.
- (4) The safety-valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6 per cent above the highest pressure to which any valve is set, and in no case to more than 6 per cent above the maximum allowable working pressure. Table 221-1 in section 12-221-5 may be used to determine the required total capacity.
- (5) One or more safety valves on each boiler shall be set at or below the maximum allowable working pressure. The

remaining valves may be set within a range of 3 per cent above the maximum allowable working pressure, but the range of setting of all the safety valves on a boiler shall not exceed 10 per cent of the highest pressure to which any valve is set.

- (6) When two or more boilers, operating at different pressures, and safety-valve settings are interconnected, the lower pressure boilers or interconnected piping shall be equipped with safety valves of sufficient capacity to prevent overpressure, considering the maximum generating capacity of all boilers.
- (7) When a boiler is fed from a water source other than a feed pump or injector, the maximum safety-valve setting on the boiler shall be no more than 80 per cent of the minimum pressure of the source.

(b) For the detailed requirements, refer to ASME Code Section I. [Eff. 12/6/82; am 12/19/83; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-4 Boiler feeding. (a)** Each boiler shall have a feed supply which will permit it to be fed at any time while under pressure.

(b) Feed supply line shall be equipped with a feed check or non-return valve. [Eff. 12/6/82; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-5 Water level indicators. (a)** No outlet connections (except for damper regulator, feedwater regulator, low-water fuel cutout, drains, steam gages, or apparatus that does not permit the escape of an appreciable amount of steam or water) shall be placed on the piping that connects the water column to the boiler. The water column shall be provided with a valved drain of at least 3/4-inch pipe size, with the discharge piped to a safe location.

(b) Each boiler shall have three or more gage cocks located within the visible length of the water glass, except when the boiler has two water glasses located on the same horizontal line. Boilers not over 36 inches in diameter, in which the heating surface does not exceed 100 square feet, need only two gage cocks. [Eff. 12/6/82; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-6 Pressure gages. (a)** Each steam boiler shall have a pressure gage with a dial graduated to approximately double the pressure at which the safety valve is set, but in no case to less than 1-1/2 times this pressure, connected to the steam space or to the steam connection to the water column. The pressure gage shall be connected to a siphon or equivalent device of sufficient capacity to keep the gage tube filled with water. A valve or cock shall be placed in the gage connection adjacent to the gage.

(b) The connections to the boiler, except the siphon, if used, shall not be less than 1/4-inch standard pipe size; but, where steel or wrought iron pipe or tubing is used, they shall not be less than 1/2-inch (13 mm) inside diameter.

(c) Each boiler shall be provided with a valve connection at least 1/4-inch pipe size for the exclusive purpose of attaching a test gage when the boiler is in service, so that the accuracy of the boiler pressure gage can be ascertained. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-7 Stop valves.** (a) Each steam outlet from a boiler (except safety-valve and water-column connections) shall be fitted with a stop valve located as close as practicable to the boiler.

(b) When a stop valve is so located that water can accumulate, ample drains shall be provided. The drainage shall be piped to a safe location and shall not be discharged on the top of the boiler or its setting.

(c) When boilers provided with manholes are connected to a common steam main, the steam connection from each boiler shall be fitted with two stop valves having an ample free-flow drain between them. The discharge of this drain shall be visible to the operator while manipulating the valve. [Eff. 12/6/82; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-8 Blowoff connection.** (a) The construction of the setting around each blowoff pipe shall permit free expansion and contraction. Careful attention shall be given to the problem of sealing these setting openings without restricting the movement of the blowoff piping.

(b) All blowoff piping, when exposed to furnace heat, shall be protected by fire-brick or other heat-resisting material, so constructed that the piping may be inspected readily.

(c) Each boiler shall have a blowoff pipe, fitted with a valve or cock, in direct connection with the lowest water space. Cocks shall be of the gland or guard type and suitable for the pressure allowed. The use of ordinary globe valves shall not be permitted. When the maximum allowable working pressure exceeds 100 psig, each blowoff pipe shall be provided with 2 valves or a valve and cock at least one of which shall be a slow-opening valve. On a boiler having multiple blowoff pipes, a single master valve may be placed on the common blowoff pipe from the boiler, in which case only one valve on each individual blowoff is required. In that case, either the master valve or the individual valves shall be slow-opening type.

(d) When the maximum allowable working pressure exceeds 100 psig, blowoff piping shall be at least extra heavy steel from the boiler to the valve or valves and shall be run full size without use of reducers or bushings. The piping shall not be galvanized.

(e) All fittings between the boiler and blowoff valves shall be of steel. Renewal of blowoff pipes or fittings shall be installed in accordance with the rules for new installations. See National Board rules for blowoff equipment. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-9 Repairs and renewals of boiler fittings and appliances.** Whenever repairs are made to fittings or appliances or it becomes necessary to replace them, the work shall comply with the requirements for new installations. The use of galvanized piping is prohibited. [Eff. 12/6/82; am 12/19/83; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-10 Attendance on power boilers. (a)** Power boilers, waste heat boilers, and high-temperature water boilers subject to this chapter shall not be left in operation unattended by a competent attendant for a period of time longer than it will take the water level to drop from a normal operating level to the lowest permissible water level, as indicated by the water gauge glass or by indicating devices or recorders, when the feed water is shut off and the boiler is forced to its maximum capacity, unless all of the following are complied with where applicable.

- (1) The boiler is equipped with an audible alarm that will operate when the water reaches the lowest permissible operating level or, for boilers having no fixed steam or water line, when the highest permissible operating temperature is reached. The audible alarm shall be sufficiently loud or so located that it can be plainly heard at the most remote point from the boiler at which the attendant is required to work.
- (2) The boiler is equipped with two low water safety devices with separate water connections to the boiler that will shut off the fuel to the burner or burners when the water reaches the lowest permissible operating level or, for boilers having no fixed steam or water line, when the highest permissible operating temperature is reached. These devices shall require manual resetting unless the burner is equipped with a full safety pilot control.
- (3) A competent attendant personally checks the operation of the boiler, the necessary auxiliaries, and the water level of the boiler at such intervals, not exceeding 60 minutes, as necessary to insure the safe operation of the boiler. The operation of the automatic water level controls shall be tested such that fuel to the burner will be shut off at the beginning of each daily period of operation and at intervals not to exceed 12 operating hours. A record of each inspection and check of controls shall be maintained and available to the inspector for a period of six months.

- (4) There is a conspicuous and readily accessible safety disconnect switch located adjacent to the boiler room entrance or, in the situation where the boiler is located outside, in the immediate vicinity of the boiler which, when operated, will cut off all power to the boiler and cause it to be shut down in a safe manner. Immediately adjacent to the disconnect device there shall be posted a sign of arresting size and design directing the observer to use the device for shutting down the boiler in event of emergency, such as observing any unsafe condition or functioning of the boiler or its appurtenances or any condition or function of the boiler which is unusual or which is, in the observer's opinion, potentially hazardous.

(b) A competent attendant means a person who is familiar with the boiler to be operated and who has been registered with the department by the owner or user.

(c) The minimum standards to be met for an attendant to be competent include, but are not limited to the following, as detailed in the ASME Code Section VII.

(1) The ability to:

- (A) Explain the function and operation of all controls on the boiler; and
- (B) Light off the boiler in a safe manner;

(2) The knowledge of:

- (A) All possible methods of feeding water to the boiler;
- (B) How to blow down the boiler in a safe manner;
- (C) What would happen and what to do in the event the water in the boiler was carried too high or too low; and
- (D) How to shut down the boiler or boilers in a safe manner. [Eff. 12/5/82; am 12/19/83; am and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-11 Conditions not treated by these requirements.** All cases not specifically treated by these requirements shall be regarded as new installations or may be referred to the department for instructions concerning the requirements. [Eff. 12/6/82; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-12 Clearances.** (a) When power boilers, or high-temperature water boilers, and their appurtenances are installed, a minimum height of 3 feet shall be provided between the top of the boiler proper and the ceiling and 3 feet between all sides of the boiler and adjacent walls or other structures.

(b) Boilers having manholes shall have 5 feet clearance from the manhole opening and any wall, ceiling, or piping that will prevent a person from entering.

(c) All boilers shall be so located that adequate space will be provided for the proper operation of the boilers and their appurtenances; for the inspection of all surfaces, tubes, waterwalls, economizers, piping, valves, and other equipment; and for their necessary maintenance, repair, and replacement of tubes. [Eff. 12/8/86; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

**§12-222-13 Controls and safety devices for automatically fired boilers.** The Provisions of ASME CSD-1-1988 shall apply to the types of controls and safety devices for automatically-fired, high-pressure steam boilers and/or forced circulation boilers. [Eff. and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)